

## YIELD AND QUALITY OF GROUNDNUT (*ARACHIS HYPOGAEA* L.) UNDER DIFFERENT ORGANIC SOURCES OF NITROGEN

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### ABSTRACT

*A field experiment was conducted during the kharif season of 2009 and 2010 to study the Yield and quality of summer groundnut (*Arachis hypogaea* L.) under different organic sources of nitrogen. The results revealed that combinations of different organic sources of nitrogen were recorded significantly influenced on yield and quality parameters of groundnut. The residual effect of organic manure significantly increased yield and yield attributes viz. Shelling %, pod yield, haulm yield, harvest index, oil content, oil yield, protein content and protein yield of groundnut. The maximum pod yield and haulm yield were found to be higher with application of 25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake and also increased oil and protein content and yield of groundnut.*

**KEYWORDS:** Groundnut, Neem Cake, Vermicompost, FYM, Poultry Manure, Yield & Quality

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### INTRODUCTION

Groundnut (*Arachis hypogaea* L.) has the first place among all the oilseed crops in India accounting for more than 40 percent acreage and 60 percent production in the country. India ranks first in area of 8.4 million hectares contributing 8.4 million tones production of groundnut (Tank *et al.*, 2006). Among the oilseed crops, groundnut has first groundnut oil is primarily used in the manufacture of vegetable oil.

The residual effect of different organic treatments may be ascribed to increased availability of nutrients due to mineralization of organic materials, release of CO<sub>2</sub>, increasing fertilizer use efficiency, accumulation of organic carbon and improvement of soil physical properties (Badole *et al.*, 2004). Use of organic manures to meet the nutrient requirement of the crop would be inevitable practices in the years to come from sustainable agriculture since, organic manures generally improve the soil physical, chemical and biological properties along with conserving the moisture holding capacity of soil and thus resulting in enhanced crop productivity along with maintaining the quality of crop produce.

### MATERIALS AND METHOD

The experiment was carried out during *kharif* season 2009-2010 at the Crop Research Farm, Department of Agronomy, Sam Higginbottom Institute of Agriculture, Technology & Sciences, (Deemed-to-be-University), Allahabad, Uttar Pradesh, India. The soil was sandy loam having pH 7.76, organic carbon 0.57 %, the lowest in available nitrogen (204.25 Kg/ha), phosphorus (25.1 Kg/ha) and medium in available potassium (314.5 Kg/ha). The experiment was laid out in Randomized Block Design, replicated thrice with 12 treatment combinations viz.

T<sub>0</sub>, Control (R.D. of N.P.K. through fertilizer); T<sub>1</sub>, (100 % RDN through FYM); T<sub>2</sub>, (100 % RDN through vermicompost); T<sub>3</sub>, (100 % RDN through poultry manure); T<sub>4</sub>, (100 % RDN through neem cake); T<sub>5</sub>, (50 % RDN through FYM + 50 % RDN through vermicompost); T<sub>6</sub>, (50 % RDN through FYM + 50 % RDN through poultry manure); T<sub>7</sub>, (50 % RDN through FYM + 50 % RDN through neem cake); T<sub>8</sub>, (50 % RDN through vermicompost + 50 % RDN through poultry manure); T<sub>9</sub>, (50 % RDN through vermicompost + 50 % RDN through neem cake); T<sub>10</sub>, (50 % RDN through poultry manure + 50 % RDN through neem cake); T<sub>11</sub>, (25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake). Control = Recommended dose of fertilizer N<sub>30</sub> P<sub>60</sub> K<sub>40</sub> kg/ha, RDN = Recommended dose of nitrogen and P & K inorganic fertilizer basal dose in all treatments. Groundnut cultivar Kaushal (G-201) was sown on 17 July 2009 and 27 July 2010, respectively, with the spacing of 30 cm x 15cm. All the recommended agronomic practices were followed to raise the crop. Various growth attributes were recorded at different stages of growth, while yield attributes and yield were recorded at harvest.

## RESULTS AND DISCUSSIONS

### Effect of Organic Manure

Based on the results of pooled data analysis are given in Table 1. The different organic manures used in this study had a significantly influenced on yield attributing characters and quality parameters of groundnut viz., Shelling %, pod yield, haulm yield, harvest index, oil content, oil yield, protein content and protein yield of groundnut.

The increment of shelling percentage (19.59%) and maximum shelling percentage (73.48%) were recorded with the combination of different organic manures (25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake) which was significantly higher (Table 1) as compared to other treatments. Shelling percentage too exhibited similar trend as the different organic treatments helped to increase the pod filling and test weight, which in turn favored the improvement in shelling percentage. Similar results have been reported by Abraham *et al.* (2008).

Application of 25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake also improved maximum pod yield (32.23 q/ha) and haulm yield (37.80 q/ha) than all the other treatment, respectively. The better response in yield attributes significantly maximum harvest index (46%) and increment of harvest index (33.41%) were recorded under the combination of different organic manures (25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake).

The beneficial effect of organic manuring might be due to improvement in the physical condition of soil as well as increased availability of plant nutrients. This finding has been supported by Mishra (2001) and Rao and Shaktawat (2001). Combination of different organic sources of nitrogen has a significantly influenced on yield and quality parameters of groundnut. The increment of oil content (28.82%) and protein content (44.87 %) as their yield in groundnut with the application of 25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake was found significantly higher (Table 2) than all the other treatment and also recorded maximum oil content (48.13%), oil yield (12.20q/ha) protein content (24.31%) and protein yield (5q/ha). Similar results have been reported by Thimmegowda (1993).

**Table 1: Effect of Different Organic Sources of Nitrogen on Yield Attributes of Groundnut (Pooled Data of Two Years)**

| Treatment Combination  | Shelling Pod yield |        | Haulm yield Harvest index |       |
|--|--------------------|--------|---------------------------|-------|
|  | (%)                | (q/ha) | (q/ha)                    | (%)   |
| 1. Control (R.D. of N.P.K through fertilizer)  | 70.08              | 20.53  | 30.65                     | 40.14 |
| 2. 100% RDN through farm yard manure   | 61.44              | 15.60  | 26.61                     | 38.30 |
| 3. 100% RDN through vermicompost   | 68.27              | 17.36  | 27.60                     | 39.98 |
| 4. 100% RDN through poultry manure   | 63.75              | 14.06  | 24.85                     | 34.48 |
| 5. 100% RDN through neem cake  | 70.65              | 19.15  | 28.85                     | 39.80 |
| 6. 50% RDN through farm yard manure + 50% RDN through vermicompost   | 73.11              | 26.10  | 34.01                     | 43.38 |
| 7. 50% RDN through farm yard manure + 50% RDN through poultry manure   | 72.23              | 19.93  | 34.53                     | 36.69 |
| 8. 50% RDN through farm yard manure + 50% RDN through neem cake  | 73.34              | 27.20  | 33.60                     | 43.49 |
| 9. 50% RDN through vermicompost + 50% RDN through poultry manure   | 72.46              | 23.78  | 32.38                     | 42.32 |
| 10. 50% RDN through vermicompost + 50% RDN through neem cake   | 72.02              | 28.83  | 37.53                     | 43.44 |
| 11. 50% RDN through poultry manure + 50% RDN through neem cake   | 72.31              | 24.85  | 32.91                     | 42.92 |
| 12. 25% RDN through farm yard manure + 25% RDN through vermicompost + 25% RDN through poultry manure + 25% RDN through neem cake | 73.48              | 32.23  | 37.80                     | 46.00 |
| S. Em. ( $\pm$ )   | 0.69               | 1.49   | 1.61                      | 2.05  |
| CD (P=0.05)  | 1.38               | 3.09   | 3.35                      | 4.25  |

**Table 2: Effect of Different Organic Sources of Nitrogen on Quality Parameters of Groundnut (Pooled Data of Two Years)**

| Treatment Combination  | Oil         |              | Protein     |              |
|--|-------------|--------------|-------------|--------------|
|  | Content (%) | Yield (q/ha) | Content (%) | Yield (q/ha) |
| 1. Control (R.D. of N.P.K through fertilizer)  | 45.21       | 6.55         | 16.78       | 2.40         |
| 2. 100% RDN through farm yard manure   | 37.50       | 3.47         | 20.01       | 1.86         |
| 3. 100% RDN through vermicompost   | 39.28       | 4.55         | 17.33       | 2.12         |
| 4. 100% RDN through poultry manure   | 37.36       | 3.32         | 17.28       | 1.53         |
| 5. 100% RDN through neem cake  | 43.75       | 5.84         | 19.56       | 2.61         |
| 6. 50% RDN through farm yard manure + 50% RDN through vermicompost   | 45.61       | 8.93         | 20.23       | 3.85         |
| 7. 50% RDN through farm yard manure + 50% RDN through poultry manure   | 34.60       | 5.28         | 22.21       | 3.17         |
| 8. 50% RDN through farm yard manure + 50% RDN through neem cake  | 46.81       | 9.39         | 22.85       | 4.55         |
| 9. 50% RDN through vermicompost + 50% RDN through poultry manure   | 45.23       | 7.90         | 20.78       | 3.62         |
| 10. 50% RDN through vermicompost + 50% RDN through neem cake   | 47.20       | 9.79         | 23.65       | 4.91         |
| 11. 50% RDN through poultry manure + 50% RDN through neem cake   | 45.91       | 8.39         | 22.05       | 3.98         |
| 12. 25% RDN through farm yard manure + 25% RDN through vermicompost + 25% RDN through poultry manure + 25% RDN through neem cake | 48.13       | 11.20        | 24.31       | 5.66         |
| S. Em. ( $\pm$ )   | 0.91        | 0.20         | 0.65        | 0.13         |
| CD (P=0.05)  | 1.89        | 0.43         | 1.36        | 0.28         |

## CONCLUSIONS

On the Basis of the findings of this experiment, it may be concluded with the combination of 25 % RDN through FYM + 25 % RDN through vermicompost + 25 % RDN through poultry manure + 25 % RDN through neem cake, have a significant direct and residual effect of groundnut production. Application of different organic sources of nitrogen may be adopted for obtaining increased the yield and quality of groundnut. However, the results being based on two-year experimentation need confirmation by further trials.

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